General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.

- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.

- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.

- This document is paginated as submitted by the original source.

- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

FM-B2303-10

CALIBRATION RESISTOR

FOR

APOLLO STANDARD INITIATOR RESISTANCE MEASURING EQUIPMENT

AIRME

NOVEMBER 1967

Designed and Constructed

for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

Contract NAS9-3787
Task 10

THE FRANKLIN INSTITUTE RESEARCH LABORATORIES
BENJAMIN FRANKLIN PARKWAY • PHILADELPHIA, PENNA. 19103

INTRODUCTION

The calibration resistor is designed to check the calibration of "AIRME" or Apollo Initiator Resistance Measuring Equipment. It supplements the built-in calibration standard in that it provides a check on the entire instrument, including the cable and adapter into which the initiator connects. The built-in standard does not check the cable and adapter. The unit is supplied with a shipping and carrying container. Both the calibration resistor and the container are shown in the photograph. While there are only ten AIRME units in use, twenty calibration resistors were constructed so that one could be in use continuously while the other is being checked against a single secondary standard.

CONSTRUCTION

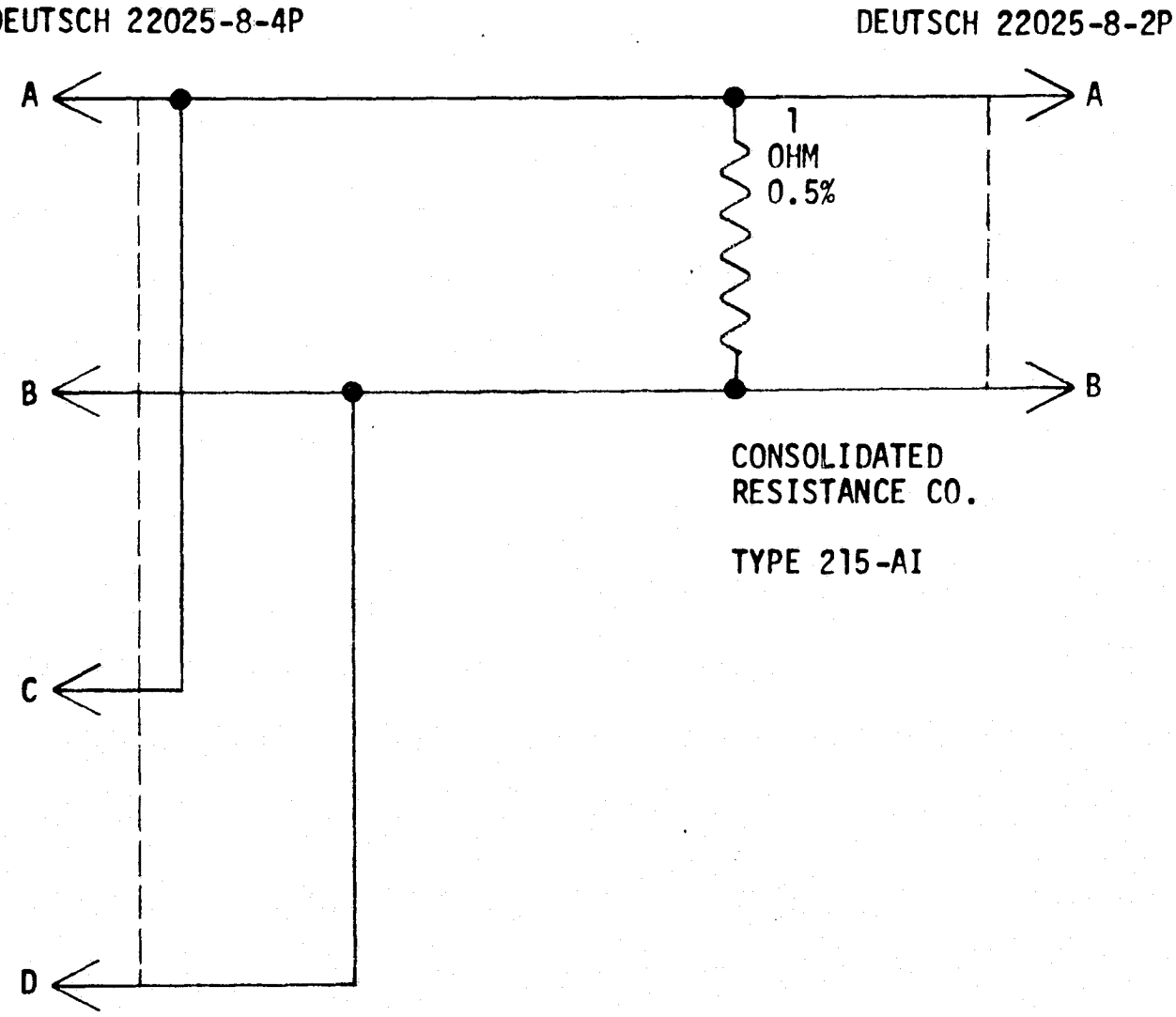
The calibration resistor consists of an aluminum housing four inches long by 7/8 inches in diameter. At each end is a connector, one has four pins and the other has two pins. These connectors are the same as used on the respective four and two pin versions of the Apollo Standard Initiator. In the housing is a precision one ohm resistor, specially constructed with three leads at each end to facilitate assembly and provide accuracy. This resistor was constructed with a tolerance of 0.5% with connection made to the tip of the leads.

The resistive element of the calibration resistor is potted in the housing with GE RTV-615 silicone rubber.

The schematic below shows the wiring and the parts list.

The accuracy of the twenty resistors was verified using a Leeds and Northrup resistance bridge, model No. 4735 after assembly, results are tabulated below. The bridge was standardized against a one-ohm standard resistor traceable to the National Bureau of Standards. The certificate of calibration for the standard resistor is appended. These measurements were made with the connector pins soldered to the resistors


CALIBRATING RESISTOR
for
APOLLO INITIATOR RESISTANCE
MEASURING EQUIPMENT
MANNED SPACECRAFT CENTER
CALIBRATING RESISTOR
APOLLO INITIATOR RESISTANCE


DEUTSCH 22025-8-4P
DEUTSCH 22025-8-2P
A
A
1
OHM
0.5%
B
B
CONSOLIDATED
RESISTANCE CO.
TYPE 215-AI
C
D

and connected directly to the bridge, with no intervening connector. Therefore, any contact resistance in the mating connectors may influence somewhat the readings on the "AIRME". Normally, this should be negligible; and since the resistors are accurate to better than 0.2%, the total accuracy should still be better than the design accuracy of 0.5%.

MEASUREMENTS ON AIRME CALIBRATION RESISTORS

Serial Number	Ohms
No. 1	.9999
No. 2	.9988
No. 3	.9997
No. 4	1.0004
No. 5	.9999
No. 6	.9999
No. 7	1.0010
No. 8	.9996
No. 9	1.0002
No. 10	.9987
No. 11	.9992
No. 12	1.0000
No. 13	.9999
No. 14	.9993
No. 15	.9999
No. 16	1.0015
No. 17	1.0007
No. 18	.9999
No. 19	.9991
No. 20	.9999

OPERATION

The calibration resistor is connected to the adapter on the "AIRME" cable and the "Resistance Calibrate" control on AIRME is adjusted so that the DVM indicates 10.00.

The "Function" switch is set to "Resistance A-B" if the two pin adapter is in use. If the four pin adapter is in use then the calibration can be checked on the "A-B" or "C-D" positions of the function switch.

Comparison of the internal calibration and the external calibration should be made. The resistance of the internal calibrating resistor may be measured by simply turning the Fuction switch to Resistance Calibrate and reading the resistance on the DVM. The Resistance Calibrate adjustment should not be varied between the time that the calibration resistor is read and corrected to 10.00, and the time that the internal calibration resistor is checked.

The second reading, the one of the internal calibrating resistor, may be used as the routine calibration value in place of the 10.00 recommended in the AIRME manual if the difference is significant.

The DVM reading from the internal calibration resistor should be slightly smaller than that of the external resistor since there is additional resistance in the cables and connections leading from the instrument to the external resistance. Variation should not be more than 1% however.

Calibration should be checked at the beginning of each work day or wherever reading problems appear using the AIRME.

CERTIFICATE OF CALIBRATION

LOCKHEED ELECTRONICS COMPANY

A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

Metuchen, New Jersey

INSTRUMENT Standard Resistor Gray Model E-1243 **SERIAL NO.** 17916

PROPERTY OF Franklin Institute **WORK ORDER NO.** 3-4-6200-8792

The above instrument has been checked and calibrated against our working standards which are traceable to the National Bureau of Standards. All specifications were found to meet those set forth by the manufacturer.

REMARKS L&N Thomas One Ohm Standard Resistor NBS # 211.01/190348, Dated 10/25/66

LOCKHEED ELECTRONICS COMPANY by: Bart Bartlett LEC ESD 3 IML QC

TEST PERFORMED BY Bartlett **DATE OF TEST** 11-21-66

Temperature: 23° C
Humidity: 45%
Certified Value 0.999926 Ohms ±0.001%

LEC 151-2